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High-density orchards need vole management

With more and more growers transitioning to high-density orchards, it's time to re-examine the need for vole monitoring and take a closer look at the economic benefits of a control program.

While high-density orchards have proven to be more profitable for growers than conventional orchards, they require a much higher investment to establish: approximately $20,000 to $30,000 per acre, depending on fruit variety and location. It can take roughly three to five years before a high-density grower breaks even on his or her investment, and an additional year to start reaping profits. If a tree is lost to vole damage before the break-even year, a grower is losing much more than the cost of the replacement tree, according to Tim Smith, a recently retired Extension specialist with Washington State University.

"If one tree dies, you will lose the cost of the replacement tree and the cost of labor to replant it, but the greatest cost

is lost fruit production," he said.

Smith has calculated that the economic loss per acre from a single tree, over its productive life, can range from $750 for Gala to $6,400 for Honeycrisp.

For growers to maximize the lifetime profit potential of each individual tree, they must protect that investment from the devastating effects of vole damage, which can be detrimental to younger trees.

"Voles cause severe damage to trees by taking the bark off the lower 6 to 18 inches and by damaging roots," Smith said. "It's very difficult to get trees to recover from that type of damage. It's time consuming and expensive and often unsuccessful. It's better to avoid the problem altogether than try to repair after the fact."

That's the approach Neil Johnson, a field services manager with Northwest Wholesale in Washington state, recommends to his growers.

"Regularly monitoring vole pressure and utilizing a weather-resistant vole bait are critical to an orchard's success," Johnson said. "Making a second vole bait treatment 30 days or more after the first is sound economic insurance."

Increased risk

"In conventional orchards, large trees and root systems are separated by wider row spacing," said Mike Parker, an Extension horticulture specialist and associate professor at North Carolina State University (NCSU). "With high-density plantings of 500 to 600 additional trees per acre, the continuous, underground root system has become the ideal buffet for pine voles, which are predominantly active below ground and harder to detect than meadow voles."

With more than 25 years of experience monitoring and researching pine vole damage in North Carolina, Parker has seen what a limiting factor they can be.

"In high-density orchards we usually see growers lose multiple trees in a row," Parker said. "The pine vole is elusive, and because damage is being done underground to the roots, growers often aren't aware until there is a significant loss."

When weighing the benefits of a control program with the cost of implementation, growers need to consider the potential for lost profits.

"If we have an insect population or pathogen, it might affect the crop that year, but voles kill trees or weaken them to the point of no production," Parker said. "With voles, the damage ramifications are felt for years. Treatment costs are inconsequential, as voles take no prisoners."

With pine voles living underground, Parker said the best method for monitoring their presence is the Apple Sign Test. Using this test, shingles are placed throughout an orchard, with food placed underneath the shingles. The locations where voles eat the food are marked on a map, and control activities are directed toward those areas, rather than the whole planting, according to NCSU.

Unlike meadow voles, the primary method for controlling pine voles is a rodenticide. In Parker's research in orchards where pine vole populations were found, it typically took him two rodenticide applications to bring the population under control.

Lessons learned

Last year, Michigan growers felt the chilling effects of a brutal winter.

"Snow arrived immediately after harvest and never melted; we had cover throughout the whole winter and it led to major problems with rodents," said Amy Irish-Brown, an Extension educator with Michigan State University. "Most growers were never able to complete applications of vole bait, and those that did weren't able to do a second application – as the snow never melted. When spring arrived, we saw a lot of damage, the worst we've seen in many years."

Patrick Goodfellow, a fifth-generation apple grower in Sparta, Michigan, never experienced much of a vole problem until last year.

"We put out a full broadcast of bait every fall, right after harvest," Goodfellow said. "While we did suffer some damage, it wasn't as much as some of our neighbors."

Many advisers recommend a full broadcast of bait, as it prevents dominant voles from hoarding the bait, allowing the whole population to feed concurrently and resulting in

faster feeding and control. Special care must be taken where orchards border rocky outcroppings and wild, forested or riparian areas where higher vole populations can occur due to migration.

Goodfellow knows how important that single application of bait was, and is preparing to bait earlier to allow for two applications.

"We are already seeing higher numbers of voles this year than we've ever seen in the past, and it's crucial we get them under control before snow cover arrives," he said.

Goodfellow recommends keeping an eye on vole hot spots and choosing your bait wisely.

"Some baits can handle bad weather better than others," he said. "In a high-density orchard there's way too much invested to risk using bait that weathers poorly, or to skip any steps when it comes to pest control. Any mistakes cost you."

– *Laura Pires*

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